CLAIMS

1. (currently amended) A method for preventing corrosion of metal surfaces of a semiconductor device during semiconductor processing, comprising:

exposing a surface of a metal layer of the semiconductor device;

depositing and selectively bonding a sacrificial protective layer overlying the exposed metal layer surface of the semiconductor device, wherein the sacrificial layer protects the exposed surface from deleterious effects until subsequent processing of the semiconductor device; and

~~subsequent processing of the semiconductor device~~ performing a deposition step with the sacrificial protective layer present, wherein the ~~subsequent processing~~ deposition step inherently removes the sacrificial protective layer.

2. (currently amended) The method of claim 1, wherein the ~~semiconductor device includes at least one of a portion of a semiconductor wafer and a semiconductor die~~ the metal layer comprises a barrier layer on a copper layer.

3. (currently amended) The method of claim 1, wherein the metal layer ~~includes a metal feature of the semiconductor device~~ comprises one of a group consisting of tantalum, tantalum nitride, and titanium nitride.

4. (currently amended) The method of claim 1, wherein the ~~exposed surface by itself is subject to deleterious effects in response to at least one of a moisture containing ambient and an ambient conducive to causing corrosion~~ deposition step comprises a plasma deposition step.

5. (currently amended) The method of claim 1, wherein the exposing the surface ~~can include at least one of~~ comprises one of a group consisting of an etching process, a chemical mechanical polishing process, a metallization process, and a photo-imageable develop layer process.

6. (currently amended) The method of claim 1, wherein the ~~deleterious effects include corrosion~~ the deposition step comprises electroplating.

7. (currently amended) The method of claim 1, wherein the ~~deleterious effects include at least one of degraded electrical performance of the semiconductor device, degraded semiconductor device reliability effects, and undesired electromigration effects~~ metal layer comprises copper.

8. (currently amended) The method of claim 1, wherein the depositing and selectively bonding ~~includes using a vapor~~ comprises applying a corrosion inhibitor in the vapor phase to the exposed metal layer surface to form the sacrificial layer on the exposed metal layer surface.

9. (currently amended) The method of claim 1, wherein the sacrificial layer ~~includes at least~~ consists of one monolayer of a vapor corrosion inhibitor.

10. (currently amended) The method of claim ~~9~~ 1, ~~further wherein subsequent processing removes the at least one monolayer of the vapor corrosion inhibitor~~ wherein the metal layer comprises aluminum.

11. (currently amended) The method of claim 1, wherein ~~the subsequent processing includes forming another exposed metal layer, said method further comprising:~~

~~exposing a surface of the another metal layer of the semiconductor device;~~

~~depositing and selectively bonding another sacrificial protective layer overlying the another exposed metal layer surface of the semiconductor device, wherein the another sacrificial layer protects the another exposed surface from deleterious effects until subsequent processing of the semiconductor device; and~~

~~subsequent processing of the semiconductor device, wherein the subsequent processing removes the another sacrificial protective layer~~ the metal layer is under a dielectric layer and the exposing comprises forming an opening in the dielectric layer to expose the surface of the metal layer.

12. (currently amended) The method of claim 1, ~~further wherein the subsequent processing includes a deposition of another layer over the semiconductor device~~ wherein the deposition step uses plasma enhanced chemical vapor deposition.

13. (currently amended) A method for preventing corrosion of an exposed metal ~~surfaces~~ surface of a metal layer of a semiconductor device during semiconductor processing, comprising:

~~exposing a surface of a metal layer of the semiconductor device;~~

depositing and selectively bonding a sacrificial protective layer overlying the exposed metal ~~layer~~ surface of the semiconductor device, wherein the sacrificial layer protects the exposed metal surface from deleterious effects until subsequent processing of the semiconductor device; and

subsequent processing of the semiconductor device, wherein the subsequent processing ~~includes removing the sacrificial protective layer, re-exposing the metal layer and depositing another layer over the semiconductor device and the re-exposed metal layer~~ comprises a step of depositing a subsequent layer, wherein the step of depositing the subsequent layer is begun without first removing the sacrificial layer and wherein the sacrificial protective layer is removed prior to completion of the step of depositing.

14. (currently amended) The method of claim 13, wherein the ~~semiconductor device includes at least one of a portion of a semiconductor wafer and a semiconductor die~~ the subsequent processing comprises depositing an interlayer dielectric by plasma enhanced chemical vapor deposition.

15. (currently amended) The method of claim 13, wherein the metal layer ~~includes a metal feature of the semiconductor device~~ comprises copper.

16. (currently amended) The method of claim 13, wherein the ~~exposed surface by itself is subject to deleterious effects in response to at least one of a moisture containing ambient and an ambient conducive to causing corrosion~~ subsequent processing comprises electroplating the metal layer with copper.

17. (currently amended) The method of claim 13, wherein exposing the surface ~~can include at least one of an~~ comprises one of a group consisting of etching process, a chemical mechanical polishing process, a metallization process, and a photo-imageable develop layer process.

18. (currently amended) The method of claim 13, wherein the ~~deleterious effects include corrosion~~ the metal layer comprises aluminum.

19. (currently amended) The method of claim 13, wherein the ~~deleterious effects include at least one of degraded electrical performance of the semiconductor device, degraded semiconductor device reliability effects, and undesired electromigration effects~~ the metal layer is under a dielectric layer and the exposing comprises etching a hole in the dielectric layer.

20. (currently amended) The method of claim 13, wherein the depositing and selectively bonding ~~includes using a vapor~~ comprises applying a corrosion inhibitor in the vapor phase to form the sacrificial layer on the exposed metal layer surface, wherein the sacrificial layer consists of a monolayer of corrosion inhibitor.

21. (withdrawn) A semiconductor processing apparatus for preventing corrosion of metal surfaces of a semiconductor device between semiconductor processing steps, said apparatus comprising:

means for exposing a surface of a metal layer of the semiconductor device; and

means for depositing and selectively bonding a sacrificial protective layer overlying the exposed metal layer surface of the semiconductor device, wherein the sacrificial layer protects the exposed surface from deleterious effects until subsequent processing of the semiconductor device.

22. (withdrawn) The apparatus of claim 21, wherein said exposing means includes at least one of a means for performing an etching process, a chemical mechanical polishing process, a metallization process, and a photo-imageable develop layer process.

23. (withdrawn) The apparatus of claim 21, wherein said apparatus further comprising:

means for subsequent processing of the semiconductor device, wherein the subsequent processing removes the sacrificial protective layer.

24. (withdrawn) An apparatus for implementing corrosion prevention of exposed metal surfaces of a semiconductor device between independent semiconductor processing steps, said apparatus comprising:

an enclosure for receiving the semiconductor device; and

means for depositing and selectively bonding a sacrificial protective layer overlying the exposed metal layer surface of the semiconductor device, wherein the sacrificial layer protects the exposed surface from deleterious effects until subsequent processing of the semiconductor device.

25. (withdrawn) The apparatus of claim 24, wherein the depositing and selectively bonding means includes a vapor corrosion inhibitor that forms the sacrificial layer on the exposed metal layer surface.

26. (withdrawn) The apparatus of claim 24, further comprising one of an internal vapor corrosion emitter, intregal vapor corrosion emitter, and an external vapor corrosion emitter, wherein the emitter provides a source of the vapor corrosion inhibitor.

27. (withdrawn) The apparatus of claim 24, wherein the sacrificial layer includes at least one monolayer of a vapor corrosion inhibitor.

28. (withdrawn) The apparatus of claim 24, wherein subsequent processing includes a removal of the at least one monolayer of the vapor corrosion inhibitor deposited on the surface.

29. (withdrawn) The apparatus of claim 24, wherein the deleterious effects include corrosion.

30. (withdrawn) The apparatus of claim 24, wherein the deleterious effects include at least one of degraded electrical performance of the semiconductor device, degraded semiconductor device reliability effects, and undesired electromigration effects.